OPERATION
AND
SERVICE MANUAL
T.O.S. NO. 136

GENERAL ELECTRIC CO.
Instrumentation & Control
228 W. Florence Ave.
Inglewood, Calif. 90301

MODEL CDH - 3.0 thru 12.5MHZ
PLUG - IN HARMONIC MARKER

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Electronic Services, Los Angele
M14788X

Telonic® INSTRUMENTS
Division of Telonic Industries, Inc.

WARRANTY

TELONIC INSTRUMENTS AND ACCESSORIES

Products manufactured by TELONIC INSTRUMENTS; Division of Telonic Industries, Inc. are guaranteed against defective materials and workmanship for a period of one year (vacuum tubes excepted) from date of purchase. This warranty does not apply to instruments that have been altered, improperly handled or damaged in any way beyond our control.

Instruments must be examined immediately upon receipt, since claims for damage in transit will not be honored by the carrier unless prompt action is taken.

CHANGES IN SPECIFICATIONS

The right is reserved to change the published specifications of equipment at any time, and to furnish merchandise in accordance with current specifications, without incurring any liability to modify equipment previously sold.

RETURNING EQUIPMENT TO FACTORY

Factory service is available for repair and readjustment of this instrument. However, a description of the trouble, plus the MODEL AND SERIAL NUMBERS of the unit should be forwarded FIRST, whereupon instructions for correcting the trouble OR authorization for returning the equipment will be given. This applies to all units, whether under warranty or not.

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SECTION I

GENERAL INFORMATION

1-1. SPECIFICATIONS.

1-2. Table 1-1. lists the specifications for the CDH HARMONIC MARKERS.

TABLE 1-1.

Specifications	
Crystal Accuracy	± 0.005%
Frequency Range	Fundamental to 1000 MHz
Marker Width	100 to 400 KHz (Adjustable by the Sweep Generator Marker Shaper Control)
Marker Amplitude	Over 0.1V peak to peak at 1000 MHz (Adjustable at Marker Size Control on Sweep Generator)
Voltage Requirements	B+ 100V regulated dc Filaments 6.3V ac

1-3. DESCRIPTION.

1-4. The Telonic CDH HARMONIC MARKERS are crystal-controlled plug-in units for use with Telonic Sweep Generators. The marker frequency can be identified by the numerals following the letters CDH.

1-5. These units consist of a Pierce Crystal Oscillator, a harmonic generator, a mixer, and a video amplifier; all contained in one "plug-in" unit occupying two marker sockets on the Telonic Sweep Generators. The output from the oscillator is fed to a two stage harmonic generator and then to a dual diode mixer where it is combined with a signal from the sweep oscillator. The resultant heterodyne signals or "beats" are then amplified in a video amplifier and fed through a low-pass filter to the Birdy-By-Pass Amplifier in the Sweep Generator.

1-6. The crystals used in this unit are manufactured specifically for the associated oscillator circuitry. Proper allowance has been made for the capacitance of the crystal holders and other reactive properties of the oscillator section.

1-7. The dual diode mixer circuit is engineered for harmonics of nearly constant amplitude over the entire range. High order harmonics sufficiently strong for a clear marker up to 1000 MHz are available from all these units.

SECTION II

INSTALLATION

2-1. GENERAL

2-2. This plug-in unit can be inserted in any two of the eight plug-in sockets, built-in on all Telonic Sweep Generators, that will provide a termination for the sweep sample input and output connections. The sweep sample input (BNC jack) can be fed from either one of two sweep sample lines in the unit or from the sweep sample output of an adjacent plug-in unit. The sweep sample output (BNC plug) should be connected to either one of the two BNC terminators on the chassis or the sweep sample input of an adjacent box, to provide a 50 ohm matched termination.

SECTION III

MAINTENANCE

3-1. GENERAL.

3-2. Maintenance of the CDH HARMONIC MARKERS will normally be limited to replacement of component parts worn out in normal use or damaged by overload, accident, etc. Since there are no adjustable components used in this unit, the major cause of poor operation can usually be traced to a defective tube or diode.

3-3. Weak harmonic output and noise are symptoms usually indicating a defective diode. The replacement diode should have a high front to back resistance ratio if optimum results are to be realized.

3-4. TROUBLESHOOTING (Refer to Figure 1.)

3-5. Ensure that the Sweep Generator is operating properly before starting troubleshooting procedure.

3-6. Figure 2 provides typical waveforms present at the various test points indicated on the schematic diagram.

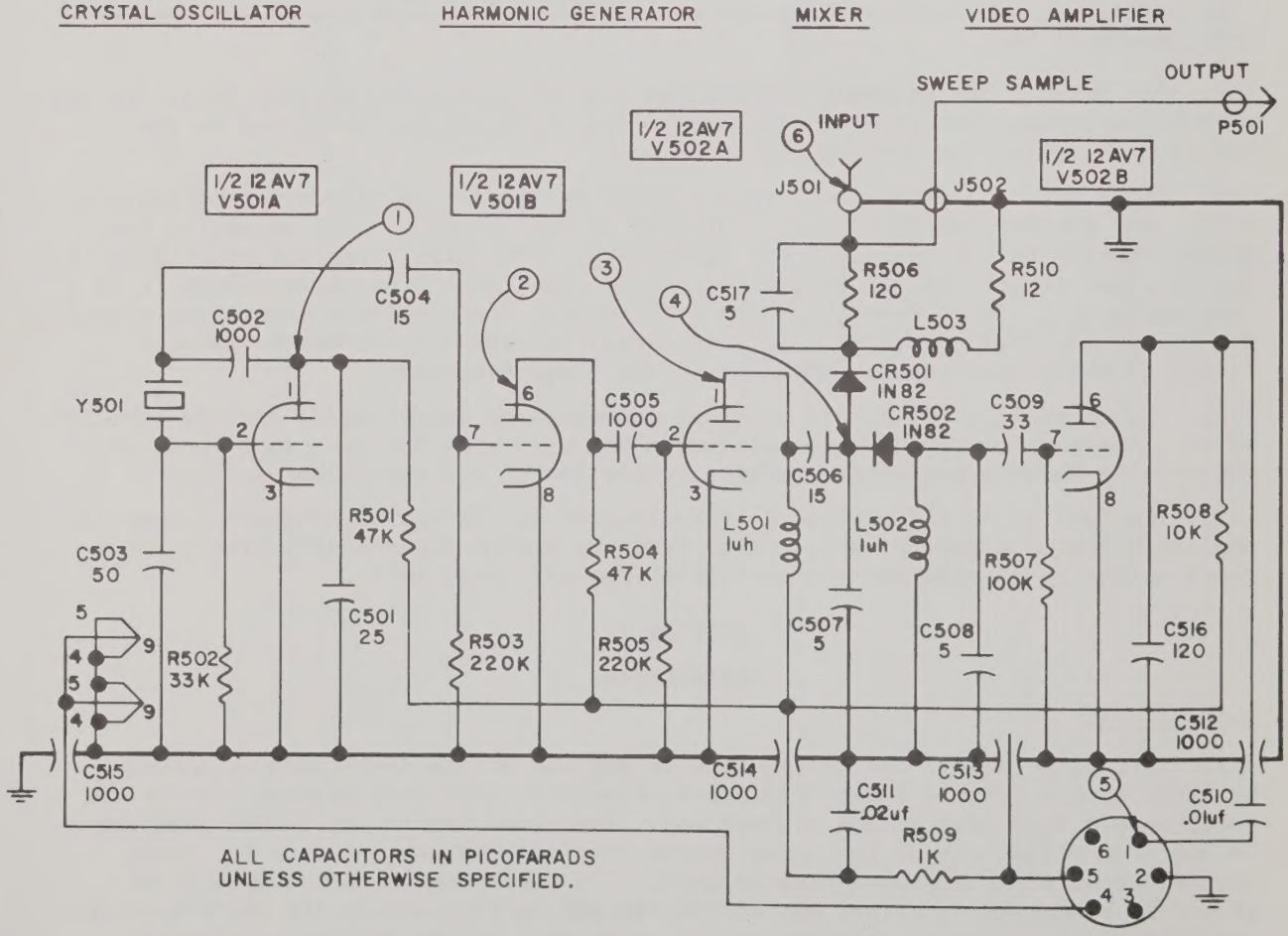


Figure 1. Schematic

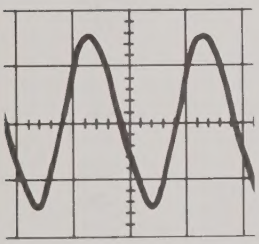
3-7. Adjust the Sweep Generator controls as follows:

a. SWEEP RATE - LINE
b. RF FUNCTION - SWEEP
c. MONITOR - RF 1
d. LEVEL - Adjust for 1V output
e. SWEEP WIDTH - 600 KHz
f. 0.1 MARKER - ON
g. POWER - ON
h. SWEEP RATIO - EQUAL
i. PLUG-IN SWEEP GENERATOR FREQUENCY - 10 MHz

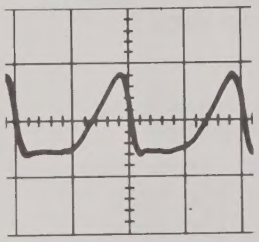
NOTE

The Telonic VR-2M Plug-in Sweep Generator was used to obtain the indicated waveforms.

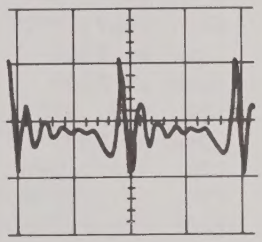
3-8. Adjust oscilloscope as indicated under the waveform.



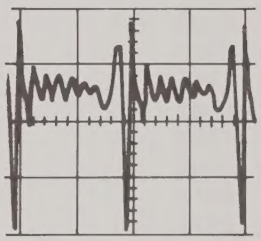
TEST POINT 1
Scale Level +40V
Vert. Sensitivity
1V/cm
Horizontal Sweep
.1 µsec/cm
Trigger-internal



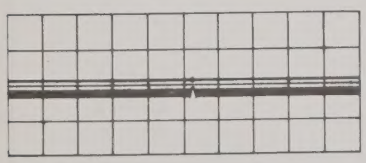
TEST POINT 2
Scale Level +50V
Vert. Sensitivity
.5V/cm
Horizontal Sweep
.1 µsec/cm
Trigger-internal



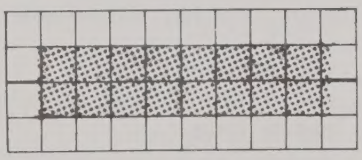
TEST POINT 3
Scale Level +95V
Vert. Sensitivity
.2V/cm
Horizontal Sweep
.1 µsec/cm
Trigger-internal



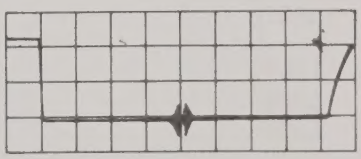
TEST POINT 4
Scale Level 0V
Vert. Sensitivity
.05V/cm
Horizontal Sweep
.1 µsec/cm
Trigger-internal



TEST POINT 5
Scale Level 0V
Vert. Sensitivity
.005V/cm
Horizontal Sweep
5ms/cm
Trigger-line



TEST POINT 6
Scale Level 0V
Vert. Sensitivity
.01V/cm
Horizontal Sweep
5ms/cm
Trigger-line



Sweep Generator Output with marker birdy indication.

Figure 2. Waveforms

SECTION IV

PARTS LIST

4-1. GENERAL.

4-2. ELECTRICAL PARTS LIST. Table 4-1 provides the complete electrical parts list for the CDH HARMONIC MARKER.

TABLE 4-1

Electrical Parts List

CIRCUIT REFERENCE NO.	DESCRIPTION	TELONIC PART NO.
C501	CFD, 25pf, NPO, ±10%, 1000 VDCW	C-9
C502	CFD, 100pf, GMV, 1000 VDCW	C-19
C503	CFD, 50pf, NPO, ±10%, 1000 VDCW	C-11
C504	CFD, 15pf, ±10%, 1000 VDCW	C-7
C505	Same as C502	
C506	Same as C504	
C507	CFD, 5pf, NPO, ±10%, 1000 VDCW	C-4
C508	Same as C507	
C509	CFD, 33pf, NPO, ±10%, 1000 VDCW	C-10
C510	CFD, .01μf, +80-20%, 500 VDCW	C-20
C511	CFD, .02μf, +80-20%, 500 VDCW	C-21
C512	CFCF, 100pf, +100%-0%, 500 VDCW	C-110
C513	Same as C512	
C514	Same as C512	
C515	Same as C512	
C516	CFD, 120pf, N750, ±10%, 1000 VDCW	C-14
CR501	DS, 1N82	D-1
CR502	Same as CR501	
J501	Receptacle, elect., UG625/U	J-7
J502	Terminator, cable, MX1684A/U	J-54
L501	Coil, radio freq., 1μh	L-102
L502	Coil, radio freq., 1μh	L-102
L503	Coil, radio freq.	*
P501	Plug, elect., UG-88C/U	J-13
R501	RFC, 47KΩ, ±10%, 1/2W	R-27
R502	RFC, 33KΩ, ±10%, 1/2W	R-36
R503	RFC, 220KΩ, ±10%, 1/2W	R-44
R504	RFC, 47KΩ, ±10%, 1/2W	R-27
R505	Same as R503	
R506	RFC, 120Ω, ±10%, 1/2W	R-16
R507	RFC, 100KΩ, ±10%, 1/2W	R-28
R508	RFC, 10KΩ, ±10%, 1/2W	R-23

PARTS LIST (Cont)

CIRCUIT REFERENCE NO.	DESCRIPTION	TELONIC PART NO.
R509	RFC, 1KΩ, ±10%, 1/2W	R-18
R510	RFC, 12Ω, ±10%, 1/2W	R-10
V501	TE, 12AV7	VT-12
V502	Same as V501	
Y501	Fundamental operation, parallel resonant circuit, 3 thru 12.5 MHz (depends on Model Number)	X-1
	Plug, wafer (2 required)	S-12
	Shield, tube (2 required)	S-13
	Socket, tube, 9-pin (2 required)	S-8
	Socket, crystal	S-18
	Clip, diode (2 required)	S-9

ABBREVIATION CODE

CFD	Capacitor, Fixed, discap
CFCF	Capacitor, Fixed, Ceramic, Feedthru
DS	Diode, Semiconductor
RFC	Resistor, Fixed, Composition
TE	Tube, Electron
*	No part No. assigned

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